Research Article

A COMPARATIVE SURVEY ON SECURE ONLINE VOTING SYSTEM

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A R T I C L E   I N F O

A B S T R A C T

Democratic process incorporates voting as an important part. Electing representatives by the common public is done by the voting process. Out of all the existing voting systems till date, a step towards online voting is a trending topic now. This paper aims at the survey and comparison of such voting systems and proposing an online voting system which makes use of a three stage verification concept via OTP (One Time Password), Finger Print biometric and Aadhar card. The confirmation to the voter after the vote is casted gives the way to tally votes and voters, removing ambiguity. The system is reliable as well as user friendly. This system also enables a faster analysis of votes and result announcement.

INTRODUCTION

Voting is a method for a group such as a meeting or an electorate to make a decision or express an opinion, usually following discussions, debates or election campaigns. Democracies elect holders of high office by voting. Residents of a place represented by an elected official are called "constituents", and those constituents who cast a ballot for their chosen candidate are called "voters". There are different systems for collecting votes like ballot method, machine based method and the emerging online method.

In the earlier days, the most common voting method in India was using paper ballots on which voters mark their preferences. This may involve marking their support for a candidate or party listed on the ballot paper, or a write-in, where they write out the name of their preferred candidate if it is not listed.

An alternative paper-based system known as ballot letters is used in Israel, where polling booths contain a tray with ballots for each party contesting the elections; the ballots are marked with the letter(s) assigned to that party. Voters are given an envelope into which they put the ballot of the party they wish to vote for, before placing the envelope in the ballot box.

Another method is "Machine voting" which uses voting machines, that may be manual (e.g. lever machines) or electronic. In Brazil, voters type in the name of the candidate they wish to vote for and then confirm their vote when the candidate's photo is displayed on screen.

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In some countries people are allowed to vote online. Estonia was one of the first countries to use online voting: it was first used in the year 2005 at local elections.[11]

Voting through online saves time and also limits the expenses of personnel as well as other necessary stationery for polling. The aspects to look into are privacy and security of the vote i.e. there would be only authorized votes and malpractices like rigging should be avoided.

LITERATURE SURVEY

There are many existing works of research on this online voting system. This paper presents a comparative analysis of some such works and comes up with a proposal for online voting system.

Firas I. Hazzaa, Seifedine Kadr [1] This paper deals with design and development of a web based voting system which mainly uses finger print for the authentication of a voter for electing the president of a university. It also makes use of web technology to make the system more practical. This proposed system allows users to scan their finger print at the time of voting and they are recognised to be valid when the scanned finger print matches with the one in the database. This system has provided an efficient, fraud free and an economic way of voting.

Shridharan [5] has implemented a system with smart card for identification and revealing the details of biometric information of the voter in order to cast his vote. The process of online voting could be deployed with three phases - the voter registration online vote capturing and the instant online counting and result declaration. This system ensures traceability and security of votes to the voters. It can prevent

multiple casting of votes. The burden of correctness is also less because the voters are allowed to cast their vote only when they are identified and verified.

Shivendra Katiyar, Kullai Reddy Meka, Ferdous A. Barbhuiya, Sukumar Nandi [2] They tried to provide biometric as well as password security to the accounts of the voters using cryptography as well as steganography at the same time. It uses images as keys in cryptography and as cover objects in steganography. Here the image is nothing but a fingerprint image of the voter. Using cryptography reduces the risk of attacks and ensures security to the system because the hacker needs to find out a template and a secret key. The idea goes with merging of secret key with cover image based on key image which produces a stego image that looks like a cover image but is undetectable by the human eye.

Jambhulakar, chakole and pradhi [3] have proposed a system that makes use of cryptographic techniques in order to ensure secure online voting. It aims at preventing the DOS attacks. When the vote is casted it is encrypted and sent to the server, which decrypts the vote before counting. It requires two keys, one for encryption and the other for decryption. To prevent the active attacker who intends to place votes when the votes are being transferred to the server, the digital signature is used. For this purpose each voter should have a private digital signature and a public digital signature verifier, for this we are using a pair of asymmetric keys for each registered voter.

Khasawneh [6] proposed an e-voting system with a two side verification at the server side and the client side respectively. Here the system generates a hard copy or a confirmation slip to the user as well as a unique number for identification. All these content are stored in a secured box. This information is used for verifying the vote before stored in final database. This side copy is printed with unique barcode that can be easily readable and scanned, and then randomly choose one copy which is tested. This two sided process provides verification and correctness for the system.

Pashine, ninave and kelapure [4] proposed an android platform for online voting system. This system is advantageous because the voter can cast his vote from his home itself without going to the polling booth and it also provides the option of gesture recognition but authentication is the problem of android platform.

This application is partitioned into three panels on the basis of its users as follows:

Admin Panel: This panel will be specifically used by members of election commission to administrate all the electoral processes including registrations of candidates & voters and monitor all other actions carried out by them. In other words it looks after all the voting process.

Candidate Panel: This panel will be specifically used by electoral candidates to interact with the election commission & voters which will help them to work efficiently not only before the election but also after the election if elected.

Voter Panel: This panel will be used by every individual with an eligibility to vote, ie.. a person with 18 years of age. Himanshu Agarwal and G.N.Pandey [8] proposed aadhar id based online voting system for Indian elections. The proposed model has a greater security in the sense that voter high security password is confirmed before the vote is accepted in

the main database of Election Commission of India. The vote is casted based on the voter verification through the unique identification Aadhar Card. The voter can confirm whether his vote is casted to the one he selected and also from the place of his wish. Automatic counting of votes and results saves time.

Gianluca Dini [10] proposed a system based on replication and tolerates both benign and fully arbitrary failures of servers. If enough servers are correct, service availability and security are ensured despite the presence of faulty servers and any number of faulty voters. A voter that suffers a crash failure can vote after recovery. The proposed service satisfies common voting requirements including voter eligibility and privacy, and tally accuracy. In addition, the service satisfies a further important requirement, namely tally verifiability without any intervention of voters. Anyone, including an external observer, can easily be convinced that the election outcome is fairly computed from the ballots that were correctly cast.

K. P. Kaliyamurthie1, R. Udayakumar, D. Parameswari and S. N. Mugunthan[7] The aim of this paper is that all the Indians of age equal or above 18, irrespective of the gender can cast their vote through online without going to any physical polling booth. Election Commission Officer who will verify whether registered user and candidates are authentic or not. This online voting system is highly secured and reliable, with a simple design and ease of use. The proposed software is developed and tested to work on Ethernet and allows online voting. It also creates and manages voting and an election detail as all the users must login by user name and password and click on his favourable candidates to register vote. This will increase the voting percentage in India. It will reduce false votes from being casted.

Integration of cryptography over network is to present a highly secure online voting system. The security level of the system is improved by the idea of random cover image generation for each voter. The user authentication process of the system is improved by adding both face recognition and password security. The recognition portion of the system is secured by the cover image. Illegal practices like rigging can be precluded by this system.

Xun Yi, EijiOkamoto [9] present an Internet voting system, in which the voter's choice remains secret even if the voter's personal computer is infected by malware or the voter is physically controlled by the adversary. In order to analyze security of their system, they give a formal definition of coercion-resistance, and provide security proof that the system is coercion-resistant. This system can achieve absolute verifiability even if all election authorities are corrupt. Based on homomorphic encryption, the overhead for tallying in this system is linear in the number of voters. Hence this system is practical for elections at a large scale, such as general elections.

Proposed Idea

The proposed system is an online voting system that has a strong verification mechanism in the sense that primary levels of security in the proposal include biometric verification through fingerprint recognition for the purpose of unique identification of the voter and Aadhar card for identification of nationality. This also confirms the presence of the voter in the voting. Later a high security One Time Password (OTP) to the registered mobile number is confirmed before the vote is

accepted in the main database of Election Commission of India.

Once the OTP is matched the voter can vote to the candidate of his own wish from a list of candidates and their symbols. After the time of voting is closed the database is analysed and a report of winning contestant as well as result analysis is declared.
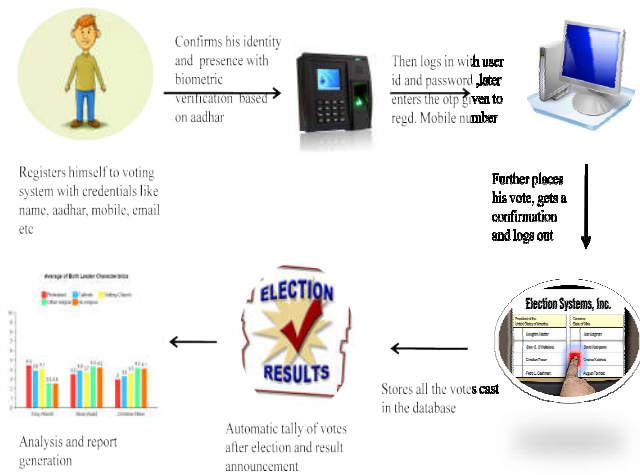
The additional feature of the model is that the voter can confirm if his/her vote has been registered and is valid. In this model a person can also vote from outside of his/her allotted constituency where the helpline centres are provided. The advantages of the proposed system include the automatic tallying of votes, thus saving a huge time and enabling Election Commissioner of India to announce the result within a very short period and moreover reducing the cost of personnel required for the election, counting and securing the voting machines.

CONCLUSION

In this paper, different online voting systems have been studied. From this study, we propose a voter friendly online voting system that works based on a three stage verification mechanism comprising OTP validation, fingerprint matching and aadhar verification. This system provides security for online voters and prevents the chances of placing malicious votes. It is a secure, reliable and efficient system of casting, recording and analysing votes.

References

1. Firas I. Hazzaa, Seifedine Kadry, Oussama Kassem Zein,"Web-Based Voting System Using Fingerprin Design and Implementation", *International Journal of Computer Applications In Engineering Sciences* ISSN: 2231-4946.
2. Shivendra Katiyar, Kullai Reddy Meka, Ferdous A.Barbhuiya, Sukumar Nandi, *" Online Voting System Powered By Biometric Security Using Steganography"* Second International Conference on Emerging Applications of Information Technology, 2011.
3. Prof. S.M. Jambhulkar, Prof. Jagdish B. Chakole, Prof. Praful. R. Pardhi "A Secure Approach for Web Based Internet Voting System using Multiple Encryption", 2014 International Conference on Electronic Systems, Signal Processing and Computing Technologies,2014.
4. Pranay R. Pashine, Dhiraj P. Ninave, Mahendra R. Kelapure, Sushil L. Raut, Rahul S. Rangari, Kamal O. Hajari," A Remotely Secure E-Voting and Social Governance System Using Android Platform", *International Journal of Engineering Trends and Technology* (IJETT)-Volume 9 Number 13 - Mar 2014
5. Srivatsan Sridharan, "*Implementation of Authenticated and Secure Online Voting System*", 4th ICCCNT 2013, Tiruchengode, India No.6, July 2013. IEEE – 31661.
6. Divya G Nair, Binu. V.P, G. Santhosh Kumar," An Improved E-voting scheme using Secret Sharing based Secure Multi-party Computation", arXiv: 1502.07469v1 [cs.CR] 26 Feb 2015
7. K. P. Kaliyamurthie, R. Udayakumar, D. Parameswari and S. N. Mugunthan, "highly secured online voting system over network", 4833 *Indian Journal Science and Technology* Print ISSN: 0974-6846 Online ISSN: 0974-5645 Vol 6 (6S) May 2013.
8. Himanshu Agarwal, G.N.Pandey, "Online Voting System for India Based on AADHAAR ID", Eleventh International Conference on ICT and Knowledge Engineering 2013.
9. Xun Yi, EijiOkamoto, "Practical Internet voting system", *Journal of Network and Computer Applications* 36 (2013) 378–387.
10. Gianluca Dini "Increasing Security and Availability of an Internet Voting System", Proceedings of the Seventh International Symposium on Computers and Communications (ISCC'02) 1530-1346/02 $17.00 © 2002 IEEE.
11. https://en.wikipedia.org/wiki/Voting

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